

ORIGINAL ARTICLE

Genus *Tecmerium* Walsingham (Lepidoptera: Blastobasidae) new to China, with descriptions of two new species

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Abstract The genus *Tecmerium* Walsingham, 1907 is recorded for the first time in China. Two species are described as new: *T. rectimarginatum* **sp. nov.** from Hebei, Tianjin, Yunnan and *T. yunnanense* **sp. nov.** from Yunnan; and two species are newly recorded from China: *T. scythrella* (Sinev, 1986) and *T. malikuli* (Adamski, 2002). Photographs of adults and genitalia are provided, and a key to the Chinese species is given.

Key words Holcocerinae, taxonomy, new record, new species.

1 Introduction

The genus *Tecmerium* was established by Walsingham (1907), based on the type species *Blastobasis anthophaga* Staudinger, 1871. He also transferred *B. mnemosynella* Millière, 1876 and *Iconisma anthophaga* var. *rosmarinella* Walsingham, 1901 to *Tecmerium*, and described *T. spermophagia* Walsingham, 1907 from Spain. Sinev (1993) treated *Oroclintrus* Gozmány, 1957 as a junior synonym of *Tecmerium*, and transferred *O. perplexus* Gozmány, 1957 to *Tecmerium*. After examining the type species, Sinev (2004) transferred *Blastobasis irroratella* Walsingham, 1891 to *Tecmerium*. Then Sinev (2008) synonymized *Holcoceroides* Sinev, 1986 and *Sinevina* Koçak & Kemal, 2007 (the replacement name for *Holcoceroides*) with *Tecmerium*, and transferred *H. scythrella* Sinev, 1986 to *Tecmerium*. Subsequently, Sinev (2014) further regarded *Exinotis* Meyrick, 1916 and *Prosintis* Meyrick, 1916 as junior synonyms of *Tecmerium*, and transferred *E. catachlora* Meyrick, 1916 and *P. florivora* Meyrick, 1916 to *Tecmerium*; in the same paper, he transferred five species to *Tecmerium*, namely, *Blastobasis arguta* Meyrick, 1918, *Zenodochium polyphagum* Walsingham, 1908, *Z. xylophagum* Walsingham, 1908, *Calosima alba* Adamski, 2002 and *C. malikuli* Adamski, 2002. Prior to this study, *Tecmerium* includes 14 species worldwide, distributed in the Palearctic (Spain, France, Hungary, Slovakia, Greece, Turkey, Cyprus, Madeira Island, Tenerife, Russia, Korea), Oriental (India, Pakistan, Thailand) and Ethiopian (Gambia, South Africa) Regions. Among them, *T. irroratella* (Walsingham, 1891) was transferred to *Holcocera* Clemens, 1863 by Adamski *et al.* (2010) based on female genital structures, while Sinev (2004, 2014) treated the same species as a member of *Tecmerium*.

The paper is to report *Tecmerium* Walsingham, 1907 for the first time from China, including two species as new to science and two newly record species for China.

2 Materials and methods

Specimens examined in this study were collected by light traps. The genitalia dissection was carried out following the methods introduced by Li (2002). Photographs of adults were taken with a Leica stereo microscope M205A plus Leica

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Application Suite 4.2 software, and genitalia were captured using a Leica DM750 microscope plus the same software as for adults.

Terminology mostly follows Adamski & Brown (1989). The term “sacculus” is used to refer to the reflexed, broadened or sclerotized ventral area of the lower division of the valva.

All the studied specimens, including the types, are deposited in the Insect Collection of Nankai University, Tianjin, China (NKU).

3 Taxonomy

Tecmerium Walsingham, 1907

Tecmerium Walsingham, 1907: 215. Type species: *Blastobasis anthophaga* Staudinger, 1871, by original designation.

Oroclintrus Gozmány, 1957: 130. Type species: *Oroclintrus perplexus* Gozmány, 1957, by original designation.

Holcoceroides Sinev, 1986: 65. Preoccupied by Strand, 1913 (Cossidae). Type species: *Holcoceroides scythrella* Sinev, 1986, by monotypy. *Sinevina* Koçak & Kemal, 2007: 6. Replacement name for *Holcoceroides* Sinev, 1986.

Exinotis Meyrick, 1916: 598. Type species: *Exinotis catachlora* Meyrick, 1916, by monotypy.

Prosintis Meyrick, 1916: 598. Type species: *Prosintis florivora* Meyrick, 1916, by monotypy.

Diagnosis. *Tecmerium* is characterized by the forewing with a short stripe extending obliquely from before middle of dorsum to the discal spot; the uncus keeled on ventral surface, the lateral arms of the gnathos fused with the tegumen, the distinct proximal flange, and the phallus dilated spherically at base in the male genitalia; the ovipositor divided into three membranous subdivisions posterior to the eighth segment, and the eighth sternum concave medially on the anterior margin in the female genitalia. These characters can help assign *Tecmerium* to Holcocerinae, although there are no distinct valid synapomorphies to define *Tecmerium* currently.

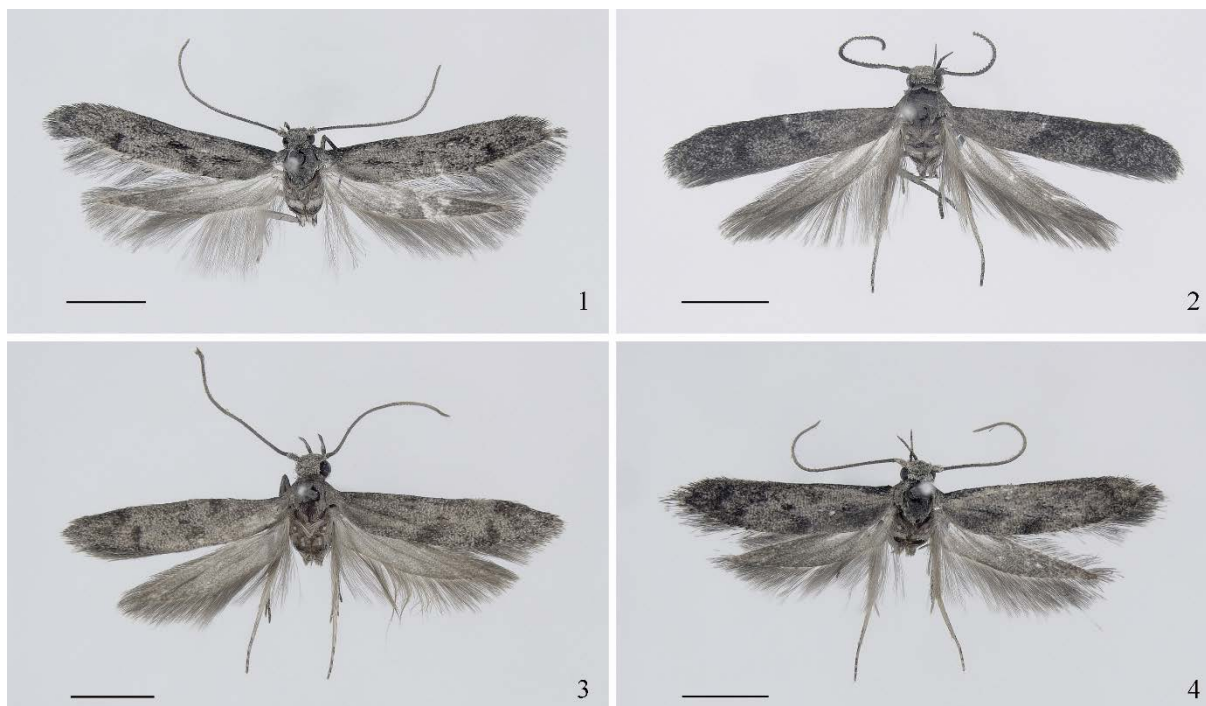
Biology. *Tecmerium anthophaga* (Staudinger, 1871) was bred from the shoots of *Lavandula stoechas* L. (Lamiaceae) (Walsingham, 1901), and its host plants also included *Rosmarinus* sp. (Lamiaceae) and *Thymelaea myrtifolia* (Poir.) D.A. Webb (Thymelaeaceae) (Robinson *et al.*, 2010); *T. rosmarinellum* (Walsingham, 1901) from *Rosmarinus officinalis* L. (Walsingham, 1901); *T. spermophagia* Walsingham, 1907 from seed-whorls of *Phlomis purpurea* L. (Lamiaceae) (Walsingham, 1907); *T. polyphagum* (Walsingham, 1908) from *Artemisia canariensis* (Besser) Less., *Allagopappus dichotomus* (L.f.) Cass., *Senecio kleinia* (L.) Less., *Sonchus gummifer* Link (Compositae), *Pinus canariensis* C. Sm. (Pinaceae), *Rubia fruticosa* Aiton (Rubiaceae), *Cytisus proliferus* L.f. (Fabaceae) and *Rhus coriaria* L. (Anacardiaceae) (Walsingham, 1908a). *Tecmerium xylophagum* (Walsingham, 1908) fed in the wood of a half-dead fig-tree (Walsingham, 1908b); *T. florivora* (Meyrick, 1916) in the inflorescence of *Mangifera indica* L. (Anacardiaceae) (Meyrick, 1916), and its host plants also included *Arceuthobium oxycedri* (DC.) M. Bieb. (Viscaceae) and *Dendrophthoe glabrescens* (Blakely) Barlow (Loranthaceae) (Robinson *et al.*, 2010). *Tecmerium catachlora* (Meyrick, 1916) did damage on the flowers of *Leucas* sp. and *Leonurus sibiricus* L. (Lamiaceae) (Robinson *et al.*, 2010).

Key to Chinese species of *Tecmerium* based on male genitalia.

1. Juxta narrowly incised inward at middle on anterior margin (Fig. 8)..... *T. malikuli*
Juxta broadly concave in triangle on anterior margin..... 2
2. Sclerite of phallus not bifurcate apically (Fig. 7) *T. rectimarginatum* sp. nov.
Sclerite of phallus bifurcate apically, forming two apical processes 3
3. Sclerite of phallus with two apical processes of equal length (Fig. 6)..... *T. scythrella*
Sclerite of phallus with two apical processes of unequal length (Fig. 5)..... *T. yunnanense* sp. nov.

Tecmerium yunnanense sp. nov. (Figs 1, 5, 9, 13)

Diagnosis. *Tecmerium yunnanense* sp. nov. is similar to *T. scythrella* (Sinev, 1986) in the male genitalia by sharing a wider rectangular gnathos, a juxta broadly concave in triangle on the anterior margin, and a sclerite of the phallus bifurcate apically. It can be separated from *T. scythrella* in the male genitalia by the eighth sternum with posterior 1/3 sclerotized (Fig. 9), and the two apical processes of the sclerite of the phallus unequal in length (Figs 5, 5b); in the female genitalia by having a signum (Fig. 13). In *T. scythrella*, the eighth sternum is sclerotized in posterior half (Fig. 10), the two apical processes of the sclerite of the phallus are equal in length (Figs 6, 6b) in the male genitalia; and the signum is absent in the female genitalia (Sinev, 1986: fig. 18).



Figures 1–4. Male adults of *Tecmerium* spp. 1. *T. yunnanense* sp. nov., holotype. 2. *T. scythrella*. 3. *T. rectimarginatum* sp. nov., holotype. 4. *T. malikuli*. Scale bars = 2.0 mm.

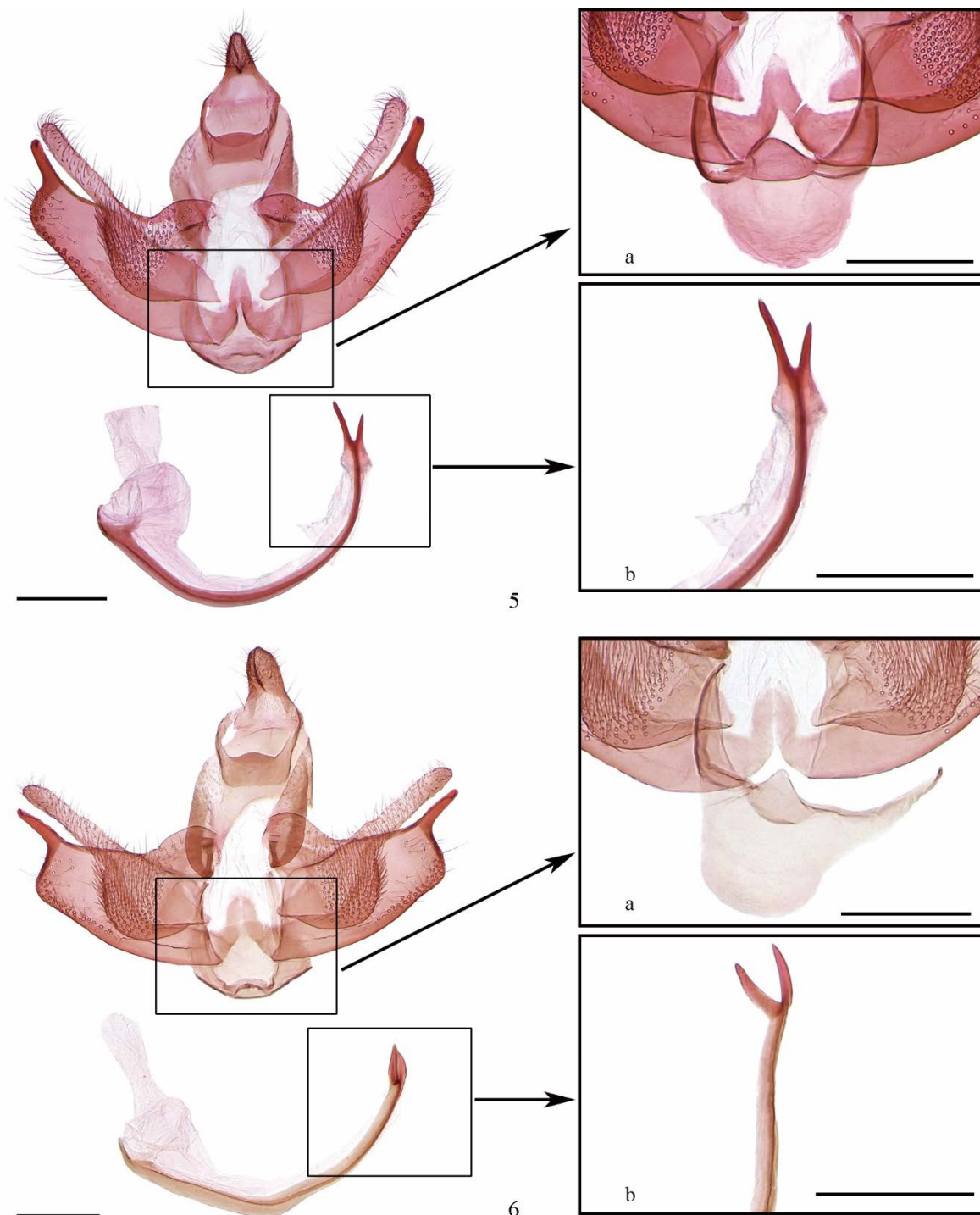
Description. Adult (Fig. 1) forewing length 5.5–6.5 mm ($n=6$). Head grayish brown, mixed with dark brown, scales tipped with grayish white. Antenna with scape grayish white on ventral surface; grayish brown on dorsal surface except part scales tipped with grayish white, anterior margin grayish white; pecten brown, grayish white at tip; flagellum dark brown, ciliated on ventral surface in male. Labial palpus brown, part scales tipped with grayish white; second segment grayish white at apex; third segment slightly shorter than second, pointed apically. Haustellum grayish brown. Thorax and tegula brown, mixed with pale gray or grayish white tipped scales. Forewing pale grayish brown, scales tipped with grayish white, distal half mixed with brown and dark brown scales, apex dark brown; humeral patch dark brown; costa black, intermixed with grayish white tipped scales, with two costal spots respectively extending to upper margin of cell: one dark brown, sub-quadrate, at basal 1/3, another brown mixed with dark brown scales, elongate oval, ranging from middle to distal 1/3; fold with a narrow rectangular dark brown spot before middle; discal, discocellular and tornal spots dark brown, tornal spot oval and connected with discocellular spot; dorsum with a brown stripe before middle, extending obliquely to below discal spot; fringe brown, intermixed with grayish white tipped dark brown scales, dark brown around apex. Hindwing and fringe pale grayish brown, becoming darker from base to apex. Legs with dorsal surface grayish white; ventral surface dark brown, part scales tipped with grayish white, all tibiae and tarsomeres grayish white at apex.

Male genitalia (Figs 5, 9). Eighth sternum with posterior 1/3 weakly sclerotized, forming a sub-rectangular plate (Fig. 9). Uncus broad at base, slightly narrowed to a rounded apex, distal half setose and longitudinally keeled on ventral surface. Gnathos rectangular, slightly convex on posterior margin, straight on anterior margin; lateral arms narrow, basally fused with tegumen. Upper division of valva sub-quadrate in basal half, clubbed in distal half, rounded apically, setose in distal 4/5; proximal flange narrow lunate. Lower division of valva broad, sub-rectangular; apex rounded, setose, with a finger-like dorsoapical process; sacculus with basal 2/3 broad, approximately 1/2 width of valva, distal 1/3 equally narrow, distal 3/5 setose. Juxta triangular, concave inward broad triangularly on anterior margin. Vinculum narrow laterally, median portion anteriorly extended sub-trapezoidally, posteriorly with a small sclerotized circular plate (Fig. 5a). Phallus approximately 1.5 times length of valva, curved ventrad, dilated spherically at base; internal sclerite curved ventrad, bifurcate at apex, forming two spine-like processes unequal in length (Fig. 5b); anellus with a few microsetae.

Female genitalia (Fig. 13). Apophyses posteriores approximately two times length of apophyses anteriores. Eighth segment with both sternum and tergum nearly straight on posterior margin, setose in posterior half; sternum concave triangularly and tergum concave semicircularly on anterior margin. Seventh sternum and tergum nearly straight on posterior margin. Ostium bursae placed at middle of intersegmental membrane between seventh and eighth segments. Ductus bursae approximately three times length of corpus bursae, constricted at basal 2/7 near inception of ductus seminalis, distal 1/7

gradually broadened towards corpus bursae; internal wall with granules from basal 1/3 to distal 1/7 on one side, with dense granules in entire distal 1/7. Corpus bursae rounded, with granules on internal wall; signum elongate oval, weakly sclerotized, with three heavily sclerotized triangular plates transversely (Fig. 13a).

Material examined. Holotype ♂, Qiunatong Village (28.10°N, 98.57°E; elev. 1767 m), Bingzhongluo Town, Gongshan County, Nujiang State, Yunnan, China, 16 June 2017, coll. Kaijian Teng *et al.*, slide No. TKJ17342. Paratypes (4♂1♀). 1♂1♀, 14–17 June 2017, others same as holotype; 2♂, Taiyanghe Nature Reserves (elev. 1450 m), Yunnan, China, 22 May–11 June 2014, coll. Zhenguo Zhang; 1♂, Mt. Weibao (elev. 2244 m), Weishan County, Yunnan, China, 23 July 2013, coll.

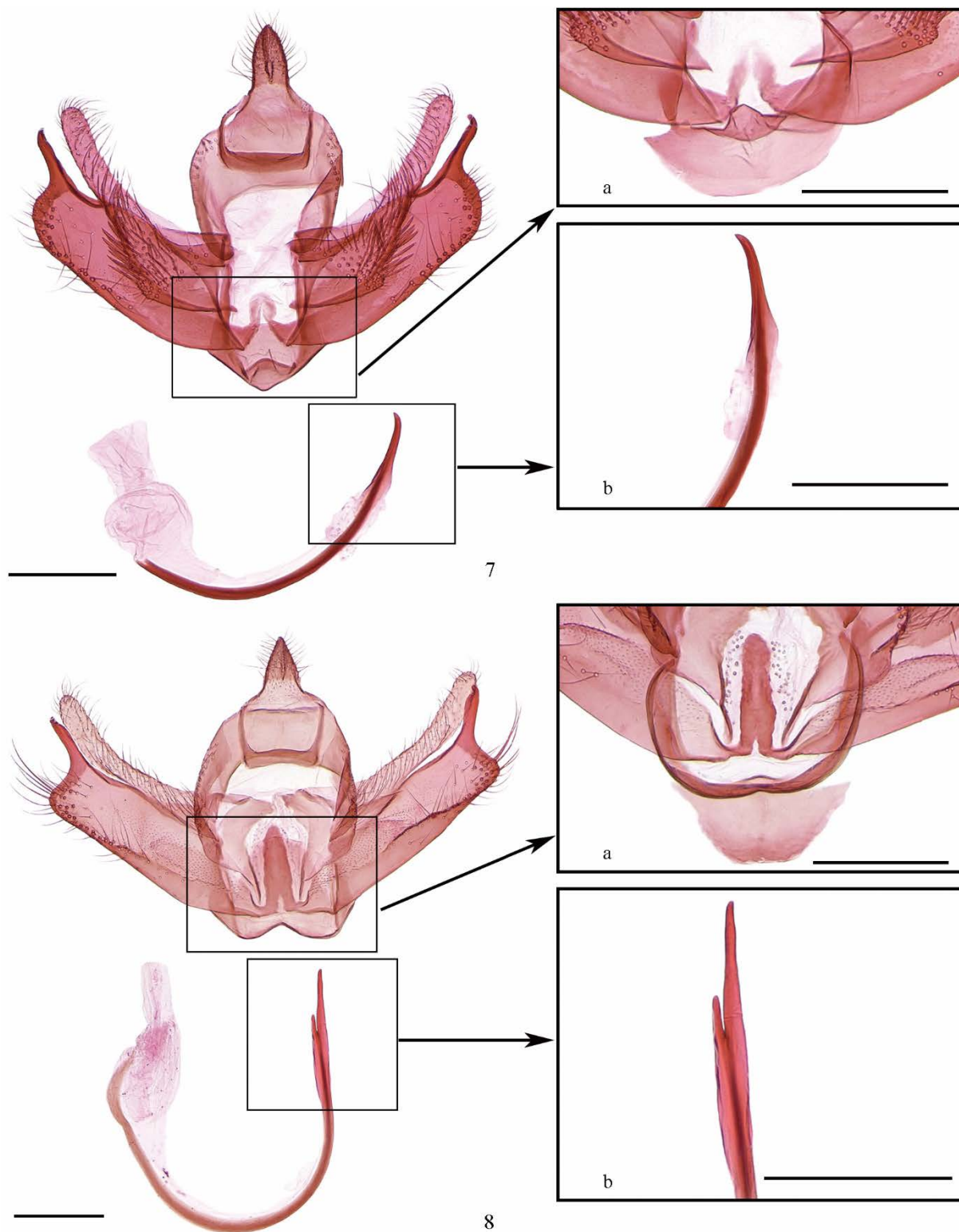


Figures 5–6. Male genitalia of *Tecmerium* spp. 5. *T. yunnanense* **sp. nov.**, paratype, slide No. TKJ17317 (a. Enlarged and unrolled vinculum, slide No. TKJ17342; b. enlarged apex of phallus, slide No. TKJ17317). 6. *T. scythrella*, slide No. TKJ17109 (a. Enlarged and unrolled vinculum, slide No. TKJ17218; b. enlarged apex of phallus, slide No. TKJ17218). Scale bars = 0.2 mm.

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Distribution. China (Yunnan).

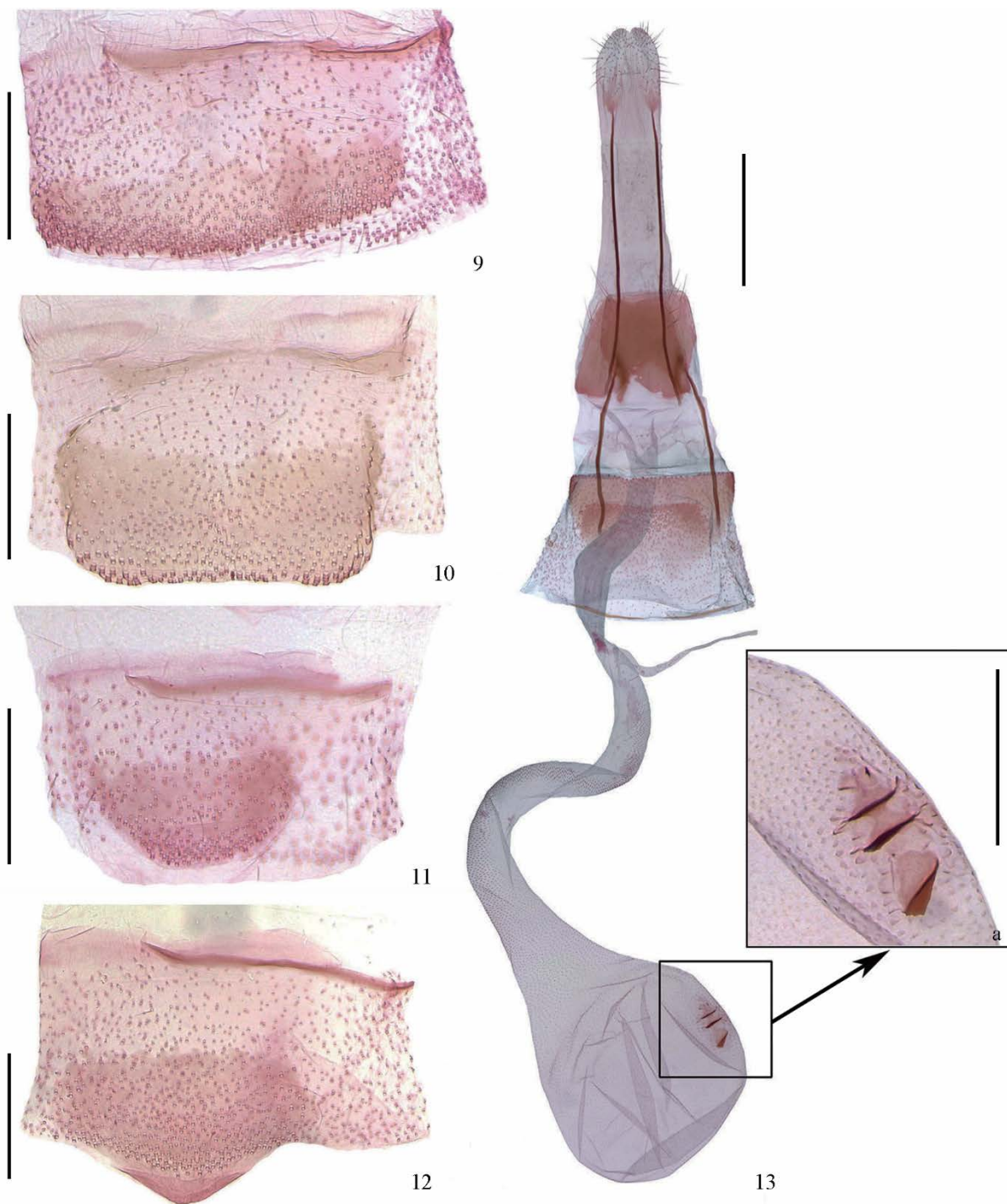
Etymology. The specific epithet of this species is derived from the type locality, Yunnan.



Figures 7–8. Male genitalia of *Tecmerium* spp. 7. *T. rectimarginatum* **sp. nov.**, paratype, slide No. TKJ17325 (a. Enlarged and unrolled vinculum, slide No. TKJ17012; b. enlarged apex of phallus, slide No. TKJ17325). 8. *T. malikuli*, slide No. TKJ17298 (a. Enlarged and unrolled vinculum, slide No. TKJ17401; b. enlarged apex of phallus, slide No. TKJ17298). Scale bars=0.2 mm.

***Tecmerium scythrella* (Sinev, 1986)** (Figs 2, 6, 10)*Holcoceroides scythrella* Sinev, 1986: 66. Type locality: Russia.*Sinevina scythrella* (Sinev): Koçak & Kemal, 2007: 6.*Tecmerium scythrella* (Sinev): Sinev, 2008: 83.

Diagnosis. Adult (Fig. 2) forewing length 4.5–6.5 mm ($n=11$). *Tecmerium scythrella* is characterized by the eighth sternum with posterior half sclerotized (Fig. 10), the relatively broader proximal flange, and the two apical processes of the



Figures 9–13. Male eighth sternum and female genitalia of *Tecmerium* spp. 9. *T. yunnanense* **sp. nov.**, paratype, slide No. TKJ17316. 10. *T. scythrella*, slide No. TKJ17247. 11. *T. rectimarginatum* **sp. nov.**, paratype, slide No. TKJ16352. 12. *T. malikuli*, slide No. TKJ17400. 13. *T. yunnanense* **sp. nov.**, paratype, slide No. TKJ17348 (a. enlarged signum). Scale bars: 9–12, 13a = 0.2 mm; 13 = 0.5 mm.

sclerite of the phallus equal in length (Fig. 6). It is similar to *T. yunnanense* **sp. nov.** in the male genitalia, and the differences see the diagnosis of *T. yunnanense* **sp. nov.**

Material examined. 1♂, Mt. Wuling (elev. 800 m), Hebei, China, 30 June 2012, coll. Houhun Li, Shuxia Wang *et al.*; 1♂, Shuangyuanfeng, Mt. Wuling, Xinglong County, Hebei, China, 15 July 2011, coll. Houhun Li and Yanpeng Cai; 2♂, Heishuihe (elev. 600 m), Mt. Baxian, Tianjin, China, 7 July 2010, coll. Yinghui Mou and Shurong Liu; 1♂, Jiufu Village (elev. 520 m), Mt. Longtang, Zhejiang, China, 28 August 2014, coll. Aihui Yin, Qingyun Wang and Suran Li; 1♂, Qingliangfeng Botanical Garden (elev. 900 m), Linan City, Zhejiang, China, 13 August 2007, coll. Qing Jin; 1♂, Mt. Longtang (elev. 390 m), Qingliangfeng, Zhejiang, China, 21 May 2012, coll. Linlin Yang and Zhenguo Zhang; 4♂, Mt. Mian (elev. 1370 m), Jiexiu City, Shanxi, China, 15–18 July 2014, coll. Tengting Liu, Meiqing Yang and Sihan Lu.

Distribution. China (Hebei, Shanxi, Tianjin, Zhejiang), Korea, Russia.

***Tecmerium rectimarginatum* sp. nov.** (Figs 3, 7, 11)

Diagnosis. *Tecmerium rectimarginatum* **sp. nov.** is similar to *T. albafaciella* (Adamski, 2002) in the male genitalia by sharing a narrow gnathos, a juxta broadly concave in triangle on the anterior margin, and a sclerite of the phallus broadly curved and not bifurcate apically. It can be separated from *T. albafaciella* by the gnathos straight on both posterior and anterior margins, and the narrower proximal flange produced ventromedially and almost forming a right angle in the male genitalia. In *T. albafaciella*, the posterior margin of the gnathos is convex sub-semicircularly, and the broader proximal flange is broadly rounded ventromedially (Adamski, 2002: fig. 6).

Description. Adult (Fig. 3) forewing length 4.5–6.0 mm ($n=6$). Head pale gray or grayish brown, scales tipped with grayish white. Antenna with scape grayish white on ventral surface; grayish brown on dorsal surface except part scales tipped with grayish white, anterior margin grayish white; pecten brown except grayish white at tip; flagellum dark brown, ciliated on ventral surface in male. Labial palpus brown, part scales tipped with grayish white; second segment grayish white at apex; third segment nearly as long as second, pointed apically. Haustellum gray. Thorax and tegula pale brown, mixed with grayish white tipped scales. Forewing pale grayish brown, scales tipped with grayish white; costa with three spots: first spot dark brown, sub-quadrangle, at basal 1/3, second spot brown mixed with pale brown scales, rectangular, ranging from middle to distal 1/3, both extending to upper margin of cell respectively, third one dark brown, sub-triangular, extending from distal 1/4 to near upper corner of cell, gradually narrowed to before apex; discal, discocellular and tornal spots dark brown, tornal spot oval and connected with discocellular spot; preapical spot oval, brown mixed with dark brown scales; dorsum with a brown stripe before middle, obliquely extending to below discal spot; fringe grayish brown, intermixed with grayish white tipped dark brown scales. Hindwing and fringe pale grayish brown, becoming darker from base to apex. Legs with dorsal surface grayish white; ventral surface dark brown, part scales tipped with grayish white, all tibiae and tarsomeres grayish white at apex. Legs dark brown on ventral surface, with scales tipped with grayish white, grayish white on dorsal surface and at apices of all tibiae and tarsomeres.

Male genitalia (Figs 7, 11). Eighth sternum with posterior half weakly sclerotized medially, forming a sub-semicircular plate (Fig. 11). Uncus broad at base, slightly narrowed to middle, almost uniform in width from middle to distal 1/4, gradually narrowed from distal 1/4 to apex, distal half setose and longitudinally keeled on ventral surface. Gnathos rectangular, posterior and anterior margins nearly straight; lateral arms narrow, basally fused with tegumen. Upper division of valva with basal 1/3 sub-quadrangle, gradually narrowed from basal 1/3 to basal 2/3, distal 1/3 clubbed, rounded apically, distal 4/5 setose; proximal flange narrowly produced ventromedially and almost forming a right angle. Lower division of valva broad, sub-rectangular; apex bluntly rounded, setose, with a spine-like dorsoapical process curved inward apically; sacculus with basal 3/5 broad, approximately 1/3 width of valva, distal 2/5 equally narrow, distal half setose. Juxta irregularly rounded, weakly sclerotized medially, broad triangularly concave inward on anterior margin. Vinculum narrow laterally, median portion anteriorly extended sub-semicircularly, posteriorly with a small sclerotized sub-quadrangle plate (Fig. 7a). Phallus nearly as long as valva, curved ventrad, dilated spherically at base; internal sclerite curved ventrad, pointed apically (Fig. 7b); anellus with a few microsetae.

Female. Unknown.

Material examined. Holotype ♂, Mt. Xiantai (38.12°N, 113.84°E; elev. 1200 m), Jingxing County, Hebei, China, 23 July 2000, coll. Haili Yu *et al.*, slide No. TKJ17006. Paratypes (5♂). 1♂, same data as holotype; 1♂, Suanzaoping Village (elev. 670 m), Neiqiu County, Hebei, China, 29 July 2000, coll. Haili Yu *et al.*; 1♂, Mt. Pan (elev. 170 m), Ji County, Tianjin, China, 20 July 2004, coll. Houhun Li *et al.*; 1♂, Houshan (elev. 1244 m), Zijiaosuo, Jingdong County, Yunnan, China, 5 July 2013, coll. Shurong Liu, Yuqi Wang and Kaijian Teng; 1♂, Jingpozhai (elev. 231 m), Nabang Town, Yingjiang County, Yunnan, China, 2 August 2013, coll. Shurong Liu, Yuqi Wang and Kaijian Teng.

Distribution. China (Hebei, Tianjin, Yunnan).

Etymology. The specific epithet of this species is derived from the Latin *rect-* (straight) and *marginatus* (margin), in reference to the straight anterior and posterior margins of the gnathos.

***Tecmerium malikuli* (Adamski, 2002)** (Figs 4, 8, 12)

Calosima malikuli Adamski, 2002: 234. Type locality: Thailand.

Tecmerium malikuli (Adamski): Sinev, 2014: 80.

Diagnosis. Adult (Fig. 4) forewing length 4.5–5.5 mm ($n=18$). *Tecmerium malikuli* is similar to *T. yunnanense* **sp. nov.** and *T. scythrella* (Sinev, 1986) in the phallus with the sclerite bifurcate apically (Figs 5b, 6b, 8b). It can be separated from the latter two species by the juxta narrowly notched at middle on the anterior margin, the relatively longer phallus approximately two times the length of the valva (Fig. 8), and the eighth sternum triangularly produced posteriorly (Fig. 12). In *T. yunnanense* **sp. nov.** and *T. scythrella*, the juxta is broadly concave in triangle on the anterior margin, the phallus is approximately 1.5 times the length of the valva, and the eighth sternum is almost straight on the posterior margin.

Material examined. 5♂, Yexianggu (elev. 762 m), Xishuangbanna, Yunnan, China, 18–20 June 2014, coll. Kaijian Teng, Wei Guan, Xiuchun Wang and Shurong Liu; 13♂, same locality, 8–13 June 2015, coll. Kaijian Teng and Xia Bai.

Distribution. China (Yunnan), Thailand.

4 Discussion

We tentatively place the two new Chinese species in *Tecmerium* based on the similarities of their genital structures with some other described species in *Tecmerium*, since there are presently no distinctly valid synapomorphies for *Tecmerium* (personal communicated with Dr. David Adamski). The two apomorphic characters in male, the eighth sternum with posterior area irregularly sclerotized (Figs 9–12) and the vinculum with median portion broadly extended anteriorly (Figs 5a–8a), are likely the synapomorphies for *Tecmerium* species in China. And the taxonomic value of these two characters needs further study.

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